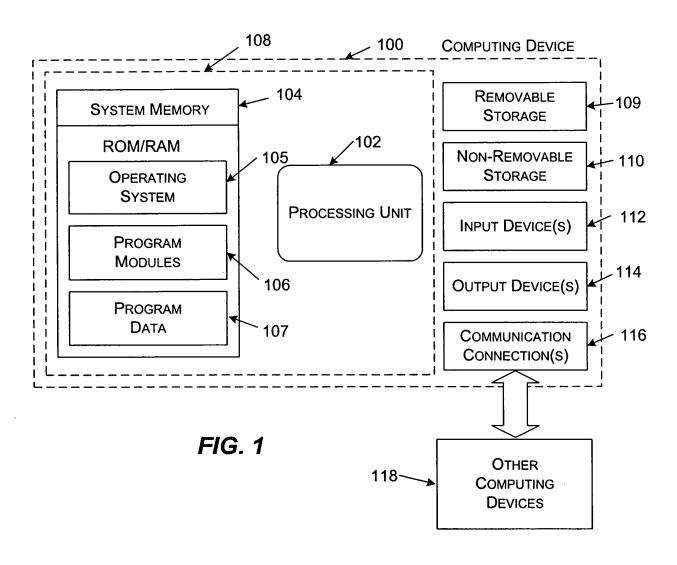Inventor: Trishul M. Chilimbi
Docket No.: 50037.60US01
Title: SYSTEM AND METHOD FOR USING DATA ADDRESS SEQUENCES OF A
PROGRAM IN A SOFTWARE DEVELOPMENT TOOL
Attorney Name: John S. Jardine
Phone No.: 206.342.6253
Sheet 1 of 9

1/9

FIG. 1

Inventor. Trisau. M. Chumsi
Docket No.: 50037.60US01
Title: SYSTEM AND METHOD FOR USING DATA ADDRESS SEQUENCES OF A
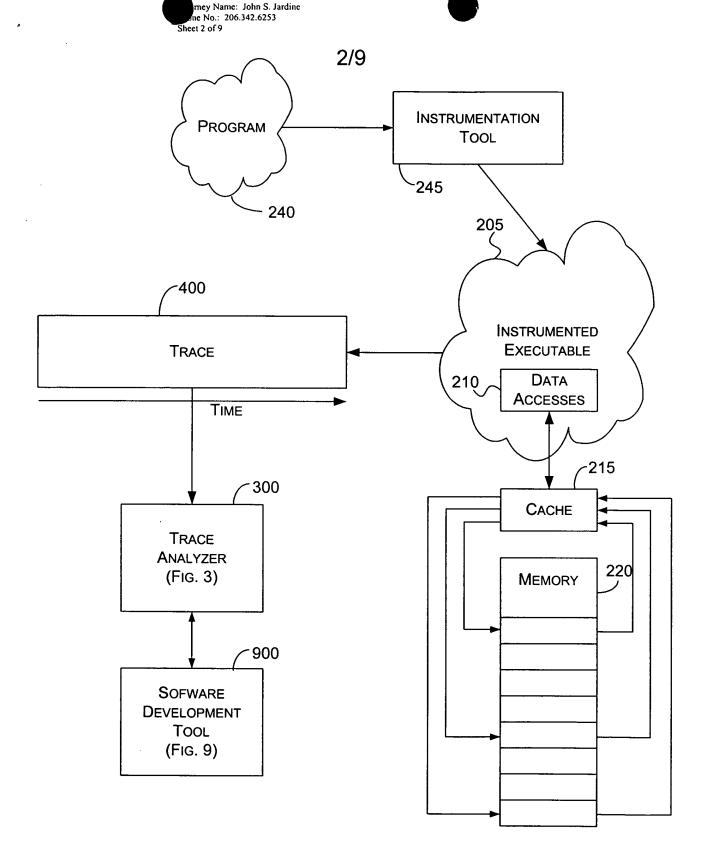PROGRAM IN A SOFTWARE DEVELOPMENT TOOL
Attorney Name: John S. Jardine
Phone No.: 206.342.6253
Sheet 2 of 9

2/9

FIG. 2

FIG. 3

vc..or. .ns.iu. M. Chilimbi
Docket No.: 50037.60US01
Title: SYSTEM AND METHOD FOR USING DATA ADDRESS SE... ...CES OF A
PROGRAM IN A SOFTWARE DEVELOPMENT TOOL
torney Name: John S. Jardine
one No.: 206.342.6253
Sheet 4 of 9

4/9

FIG. 4

.nven.or: .ns.u. .v.. C.n.im.i
Docket No.: 50037.60US01
Title: SYSTEM AND METHOD FOR USING DATA ADDRESS SEQUENCES OF A
OGRAM IN A SOFTWARE DEVELOPMENT TOOL
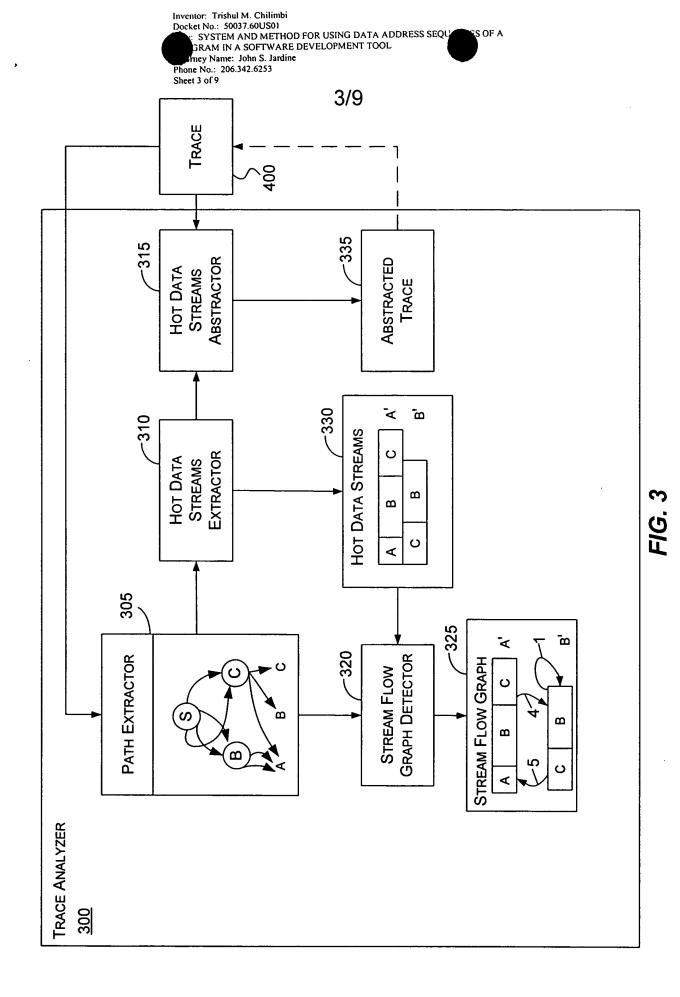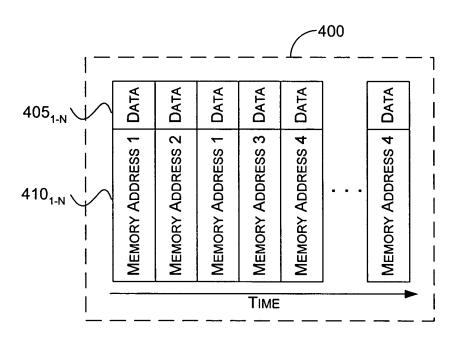mey Name: John S. Jardine
ne No.: 206.342.6253
Sheet 5 of 9

5/9

```
         ┌─────────────┐
         │    START    │ ～505
         └──────┬──────┘
                │
                ▼
    ┌───────────────────────┐
    │ INSTRUMENT EXECUTABLE  │ ～510
    └───────────┬───────────┘
                │
                ▼
    ┌───────────────────────┐
    │ EXECUTE INSTRUMENTED   │
    │      EXECUTABLE        │ ～515
    └───────────┬───────────┘
                │
                ▼
    ┌───────────────────────┐
    │  TRANSFORM TRACE DATA  │
    │       (FIG. 6)         │ ～520
    └───────────┬───────────┘
                │
                ▼
    ┌───────────────────────┐
    │     ANALYZE TRACE      │
    │       (FIG. 9)         │ ～525
    └───────────┬───────────┘
                │
                ▼
         ┌─────────────┐
         │     END     │ ～530
         └─────────────┘
```

FIG. 5

Inventor: Trishul M. Chilimbi
Docket No.: 50037.60US01
Title: SYSTEM AND METHOD FOR USING DATA ADDRESS SEQUENCES OF A
PROGRAM IN A SOFTWARE DEVELOPMENT TOOL
Attorney Name: John S. Jardine
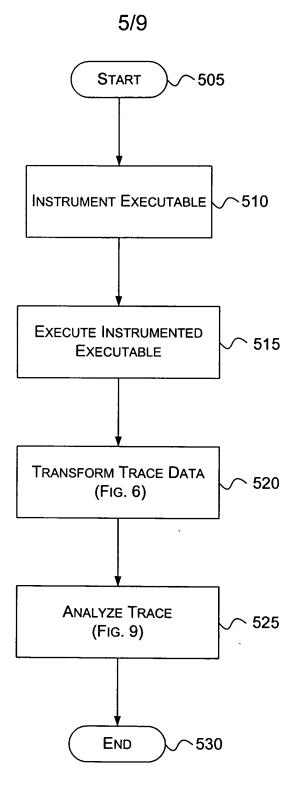Phone No.: 206.342.6253
Sheet 6 of 9

6/9

FIG. 6

Inventor: Trishul M. Chilimbi
Docket No.: 50037.60US01
⬤: SYSTEM AND METHOD FOR USING DATA ADDRESS SEQU⬤ OF A
⬤RAM IN A SOFTWARE DEVELOPMENT TOOL
⬤ney Name: John S. Jardine
Phone No.: 206.342.6253
Sheet 7 of 9

7/9

BEGIN — 705

CONSTRUCT GRAMMAR FROM TRACE — 710

EXTRACT HOT DATA STREAMS (FIG. 10) — 715

(OPTION) UPDATE STREAM FLOW GRAPH — 720

MORE COMPRESSION DESIRED? — 725

CREATE NEW TRACE BY REMOVING COLD DATA SEQUENCES — 730

Y

N

RETURN — 735
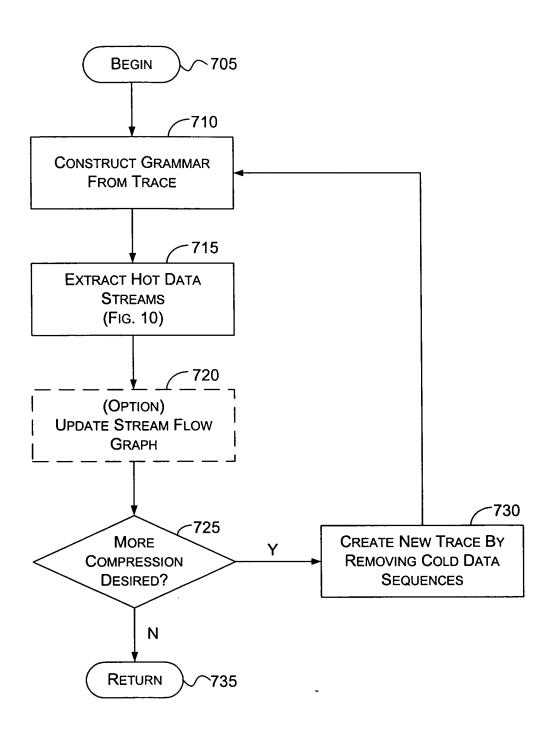
FIG. 7

Inventor: Trishul M. Chilimbi
Docket No.: 50037.60US01
      SYSTEM AND METHOD FOR USING DATA ADDRESS SEQU   OF A
      RAM IN A SOFTWARE DEVELOPMENT TOOL
      ey Name: John S. Jardine
Phone No.: 206.342.6253
Sheet 8 of 9

```
        ( BEGIN )  ~ 805
            |
            v
+---------------------------+
| CONSTRUCT A SEQUENCE      |
| OF CONSECUTIVE DATA       | ~ 810
| ACCESSES FROM WPS         |
+---------------------------+
            |
            v
          / 815 \
        / ANY      \        N
       < SEQUENCES   >------------> ( RETURN ) ~ 820
        \ LEFT?    /
          \      /
            |
            Y
            v
+---------------------------+
| DETERMINE IF COST OF      |
| ACCESSING DATA IN         | ~ 825
| SEQUENCE IS GREATER       |
| THAN THRESHOLD            |
+---------------------------+
            |
            v
          / 830 \
   N    / GREATER  \
 <-----<  THAN       >
        \ THRESHHOLD?/
          \        /
            |
            Y
            v
+---------------------------+
| MARK SEQUENCE AS          | ~ 835
| HDS                       |
+---------------------------+
```

FIG. 8

DAEDALUS: DRILL TOOL

HOT DATA STREAMS

| NEXT | PREV | STEP INTO | BACK INTO |

```
55:    ▲ HOT DATA STREAM 32
578:   ▲ HOT DATA STREAM 33
38:    ▲ HOT DATA STREAM 34
133:   ▶ HOT DATA STREAM 35
133:     NON-HEAP OBJ 5216952
133:     NON-HEAP OBJ 5217048
133:     NON-HEAP OBJ 5217064
133:     NON-HEAP OBJ 5217064
133:     NON-HEAP OBJ 5217072
133:     NON-HEAP OBJ 5216960
133:     NON-HEAP OBJ 5217056
133:     NON-HEAP OBJ 5217064
133:     NON-HEAP OBJ 5217064
133:     NON-HEAP OBJ 5198128
133:     NON-HEAP OBJ 5198376
91:    ▲ HOT DATA STREAM 36
133:   ▲ HOT DATA STREAM 37
789:   ▲ HOT DATA STREAM 38
```

HOT STREAM INFORMATION

PROPERTY	VALUE
HEAT	95260
FREQUENCY	8660
SPATIAL REGULARITY/SIZE	11
TEMPORAL REGULARITY	5053
UNIQUE OBJECTS	8
CACHE PACKING RATIO 32	16
CACHE PACKING RATIO 64	20
ADDRESS	5216952

H:\DEMO\TEST\INTEGRATE.C

```c
INT I;
DOUBLE   ERRMAX, H, HTEMP, XNEW

H = HTRY;
FOR (;;)
{
RUNGE_KUTTA_STEP(W, *X, H YTEMP1, ERR );
ERRMAX = 0.0;
FOR (I = 0; I < 4 ; I++)
ERRMAX = DMAX(ERRMAX, FABS (ERR[I] / YSCAL[ I ]));
ERRMAX /= EPS;
IF (ERRMAX < 1.0)
  BREAK;
HTEMP = SAFETY * H * POW(ERRMAX, PSHRNK);
H = 9 H > 0.0 ? DMAX(HTEMP, 0.1 * H) :  DMIN(HTEMP, 0.1 * H );
XNEW = (*X) + H;
IF (XNEW ++ *X)
{
  FPRINTF(STDERR, "STEPSIZE UNDERFLOW IN RUNGE_KUTTAIN");
  RETURN FALSE;
}
}
IF ( ERRMAX > ERRCON )
*HNEXT = SAFETY * H * POW(ERRMAX, PGROW);
ELSE
*HNEXT = 5.0 * H;
*X += ( *HDID = H );
FOR (I = 0 ;I < 4 ;I++)
  Y [ I ] = YTEMP1 [ I ] ;
```

FIG. 9